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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/525,499

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Valerie Bousquet

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11/12/2008

HARNESS, DICKEY & PIERCE, P.L.C.

P.O. BOX 8910

RESTON, VA 20195

EXAMINER

SARKAR, ASOK K

ART UNIT

PAPER NUMBER

2891

MAIL DATE

DELIVERY MODE

11/12/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/525,499	<b>Applicant(s)</b> BOUSQUET ET AL.	
	<b>Examiner</b> Asok K. Sarkar	<b>Art Unit</b> 2891	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on 28 August 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-4 and 8-10 is/are pending in the application.  
     4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 8-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 February 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 28, 2008 has been entered.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

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were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

1. Claims 1 – 4 and 8 – 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hatano, US 5,740,192.

Regarding claim 1, Hatano teaches a method of growing a semiconductor layer structure, the method comprising the steps of:

- growing a first (Al,Ga)N layer over a substrate at the first substrate temperature by MBE using ammonia as the nitrogen precursor;
- cooling the substrate to a second substrate temperature lower than the first substrate temperature, while maintaining the supply of ammonia to the substrate;
- growing an (In,Ga)N quantum well structure over the first (Al,Ga)N layer using ammonia as the nitrogen precursor;
- heating the substrate to a third substrate temperature higher than the second substrate temperature, while maintaining the supply of ammonia to the substrate; and
- growing a second (Al,Ga)N layer over the quantum well structure at the third substrate temperature using ammonia as the nitrogen precursor mainly with reference to Example II – 11(Fig. 14) in column 24 and also with reference to

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Examples II – 9 (Fig. 12) and Example II – 10 (Fig. 13) in columns 20 and 21 respectively.

Hatano teaches the first substrate temperature is within the range 850°C to 1050°C, the second substrate temperature is within the range 650°C to 1000°C and the third substrate temperature is within the range 850°C to 1050°C with reference to Example II – 11 in column 24 and MBE deposition temperatures with reference to Example II – 4 in column 13. Hatano also teaches the ratio of the supplied ammonia to supplied elemental metal is within the range 10:1 to 10,000:1 with references to Example II – 6 and Example II – 11 (flow rate of ammonia @ 10 l/min and flow rate of TMG @ 30 – 100 cc/min).

Hatano teaches these limitations of growing the first and second layers of (Al,Ga)N and the (In,Ga)N layer by MOCVD process but fails to explicitly teach growing these layers by the MBE process.

Hatano, however, teaches growing these (Al,Ga)N and (In,Ga)N layers by the MBE process with reference to Example II – 4 and also with reference to Example II – 6 wherein he teaches that MOCVD method can also be replaced by the MBE method in column 18, lines 21 – 27.

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify Hatano and grow the layers by MBE as taught by him in column 18, lines 21 – 27.

Regarding claims 2 – 4, Hatano teaches the first (Al,Ga)N layer has a first conductivity type of n – type and the second (Al,Ga)N layer has a second conductivity type of p – type with reference to Figs. 12, 13 and 14.

Regarding claims 8 – 10, Hatano teaches a light emitting diode with reference to Figs. 12, 13 and 14.

### ***Response to Arguments***

2. Applicant's arguments filed August 28, 2008 have been fully considered but they are not persuasive due to the following reasons. The Applicant alleges (page 4, starting in paragraph 2) that Hatano fails to resolve the low MBE growth temperature and requires that the temperature has to be kept at 650°C. The Examiner disagrees with this characterization since Hitano clearly teaches (with reference to Example II – 6 in column 18, lines 21 – 27) that application of MBE in stead of the MOCVD method will require selection of suitable raw materials. The nitride layers in this example were grown at temperatures higher than 650°C.

Regarding the ratio of ammonia to elemental metal (page 4, paragraph 4), again Hitano teaches the ratio (see above rejection) which falls within the range. The Applicant is also directed to the arguments made in the office action mailed May 29, 2008, wherein the reference of Damilano was introduced. Damilano also teaches that the low ammonia reactivity can be overcome by increasing the ammonia flow rate.

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify the quality of the intended GaN layer by judiciously

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adjusting and controlling the temperature and flow rate ratios through routine experimentation and optimization to achieve optimum benefits. Growth at higher temperatures is desirable to manufacture a device so that the crystalline defects such as dislocations are automatically anneal out during the growth.

Furthermore, the high V/III ratio used by the Applicant is also used by Hatano and therefore one with ordinary skill in the art at the time of the invention will be able to duplicate the MOCVD results also by MBE method using high deposition temperatures and high V/III ratio.

### ***Conclusion***

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Asok K. Sarkar whose telephone number is 571 272 1970. The examiner can normally be reached on Monday - Friday (9 AM- 6 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sue A. Purvis can be reached on 571 272 1236. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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4. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Asok K. Sarkar/  
Primary Examiner, Art Unit 2891\*\*\*